**Assignment-1**

1. A reflex klystron operates at the peak mode n=2 with Vo =280 V, Io = 22mA, and Signal Voltage V1=30V. Find the Input power, Output power and Efficiency.

2. A cylindrical magnetron has anode voltage 20KV , radii of the anode and cathode cylinders as 'a'=5cm and b=10cm. Find the hull cut-off magnetic field.

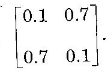
3. A two cavity klystron has dc applied voltage of 1000 V. The spacing between the buncher grid is 1mm. If the amplitude of the applied AC voltage is 100V. Determine the depth of modulation.

4. Derive the criterion for classifying the modes of operation for Gunn effect diodes.

5. Prove that a cavity resonator is nothing but an LC circuit.

6. Prove that it is impossible to construct a perfectly matched, lossless and reciprocal three-port junction.

7. Power at the input port is 900mW. If this power is incident on20dB coupler with directivity 40dB, What is the coupled and transmitted power?

8. Discuss the properties of Scattering-matrix. The scattering matrix of a two-port device is 

The incident power to port 1 is P1=50mW and P2=0mW.

(i) Calculate a1 and a2

(ii) Using the scattering matrix, find b1 and b2

(iii) Determine the reflected power at each of the ports.

9. (i). Show how the directional coupler can be used as 3dB splitter/combiner using mathematical expressions.

(ii). Using the properties of scattering matrix of a lossless, reciprocal microwave junction, prove  
that for a four port network if all the four ports are matched, the device shall be a  
directional coupler.

10. A Three port circulator has an insertion loss of 1dB, isolation 30 dB and VSWR = 1.5. Find the  
S – matrix.